Geology of diverse early Archean (>3700 Ma) *Akilia association* supracrustal enclaves on Qilangarssuit and surrounding islands, southern West Greenland

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The geology, age and origin of pre-3.7 Ga supracrustal sequences on Akilia (island), used to define the *Akilia association* in West Greenland and regarded as the oldest marine sediments containing biosignatures, has been hotly debated. Problems inherent with interpreting such multiply metamorphosed units have contributed to long-standing debates over protolith (igneous or sedimentary?) and interpretation of complex zircon age spectra (inherited or magmatic?). Our approach has been to map the supracrustal rocks at appropriate scales, with sampling guided by mapping. Coupled with geochemistry, this work addresses contested issues such as the likelihood these rocks carry information about early Archean surface environments and potential biosignatures. Considering the rarity of pre-3.7 Ga sediments and the importance of these rocks in understanding Earth evolution, it is pertinent to extend this approach beyond Akilia to other supracrustal outcrops in the Godthåbsfjord/Ameralik region in Greenland.

In June 2004, a mapping program (1:50 and 1:100) was undertaken on SE Qilangarssuit and several small islands. Structurally crosscutting orthogneisses were identified and geochemistry coupled with ion microprobe geochronology confirm a >3.7 Ga age of associated supracrustal enclaves. Determining the age of such multiply metamorphosed rocks is problematic, however the distinction between igneous and metamorphic zircons based on $[U/Th]_{zircon}$ and $\delta^{18}O_{zircon}$ resolves this problem.

Trace element, $\delta^{18}O$ (+16.4‰) and mass independent sulfur isotopes ($\_^{33}S$ >0.6‰) corroborate a sedimentary origin for the *Akilia association* Fe-rich quartzitic enclaves. These studies provide mutually supportive means for establishing a sedimentary protolith even for highly metamorphosed supracrustal assemblages.